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WHAT IS CLAIMED IS:

- 1. A method for reducing thick film stress of spin-on dielectric comprising the following steps:
 - a) spin coating a first dielectric layer on a substrate
- 5. b) growing a liquid-phase-deposition (LPD) silica layer on the first dielectric layer; and
 - c) spin coating a second dielectric layer on the LPD silica layer.
 - 2. The method according to claim 1 prior to step c) further comprising:
- b') thermal curing the resulting substrate/the first dielectric layer/the LPD silica layer structure from step b).
 - 3. The method according to claim 1/prior to step c) further comprising:
 - b') subjecting the LPD silica layer to a nitrogen plasma treatment or NH₃ plasma treatment.
 - 4. The method according to claim 1, wherein the first dielectric layer has a thickness between 100 to 700 nm.
- 5. The method according to claim 1, wherein the second dielectric layer has a thickness between 100 to 700 nm.
- 6. The method according to claim 4, wherein a summation of the thickness of the first dielectric layer and a thickness of the second dielectric layer are between 800 to 1200/nm.
 - 7. The method according to claim 1, wherein the LPD silica layer has a thickness between 5 to 100 nm.
- 30 8. The method according to claim 7, wherein the LPD silica layer has a thickness between 10 to 30 nm.

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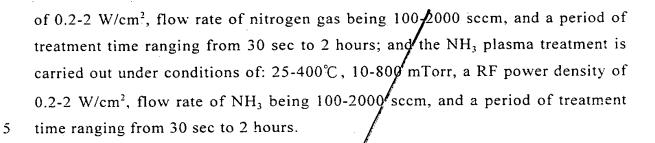
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- 9. The method according to claim 1, wherein said first dielectric layer and said second dielectric layer are a low-K dielectric material of methyl silsesquioxane (MSQ), or hydrogen silsesquioxane (HSQ).
- 10. The method according to claim 9, wherein said first dielectric layer and said second dielectric layer are methyl silsesquioxane (MSQ).
- 11. The method according to claim 1, wherein step b) comprises immersing the substrate into a silica-supersaturated hydrofluosilicic acid (H₂SiF₆) solution to form a fluorine-containing silica layer on the first dielectric layer for a period of time.
 - 12. The method according to claim 11, wherein the silica-supersaturated H₂SiF₆ solution is prepared by elevating a temperature of a silica-saturated H₂SiF₆ solution for 10°C or above.
 - 13. The method according to claim 12, wherein the temperature of the silica-saturated H_2SiF_6 solution is about $0^{\circ}C$, and the elevated temperature of the silica-supersaturated H_2SiF_6 solution is about $25^{\circ}C$.
 - 14. The method according to claim 13, wherein the silica-saturated H_2SiF_6 solution is prepared by adding a sufficient amount of silica powder into a H_2SiF_6 solution having a concentration between 0.5-5.0 M, stirring the resulting mixture at 0° C for a period of time, and then filtering the mixture for removal of undissolved silica powder.
 - 15. The method according to claim 11, wherein the fluorine-containing silica layer comprises 6-10 atom% of fluorine.
- 16. The method according to claim 3, wherein the nitrogen plasma treatment is carried out under conditions of: 25-400°C, 10-800 mTorr, a RF power density



- 17. The method according to claim 11/prior to step c) further comprising:
- b') subjecting the fluorine-containing silica layer to a nitrogen plasma treatment or NH₃ plasma treatment.

18. The method according to claim 17, wherein the fluorine-containing silica layer after the nitrogen plasma treatment or NH₃ plasma treatment .has 3-50 atom% of nitrogen and 0.5+10 atom% of fluorine.

- 15 19. The method according to claim 2, wherein the thermal curing in step b') is carried out in a nitrogen atmosphere at a temperature ranging from 150 to 650 °C for a period of 30 minutes to 2 hours.
- 20. The method according to claim 1 prior to the spin coating of the second dielectric layer in step c) further comprising heating and drying the LPD silica layer grown in step b).
 - 21. The method according to claim 2 prior to the thermal curing in step b') further comprising heating and drying the LPD silica layer grown in step b).
 - 22. The method according to claim 3 prior to the nitrogen plasma treatment or the NH₃ plasma treatment in step b') further comprising heating and drying the LPD silical layer grown in step b).
 - 23 The method according to claim 1 after the spin coating of the second dielectric layer in step c) further comprising thermal curing the resulting

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substrate/the first dielectric layer/the LPD silica layer/the second dielectric layer structure from step c).

- 24. The method according to claim 23, wherein the thermal curing is carried out in a nitrogen atmosphere at a temperature ranging from 150 to 650℃ for a period of 30 minutes to 2 hours.
- 25. A sandwich dielectric structure having a reduced thick film stress comprising:
- a first dielectric layer having a thickness between 100 to 700 nm formed on a substrate:
- a liquid-phase-deposition (LPD) silica layer having a thickness between 5 to 100 nm formed on the first dielectric layer; and
- a second dielectric layer having a thickness between 100 to 700 nm formed on the liquid phase deposited (LPD) silica layer.
- 26. The structure according to claim 25, wherein said first dielectric layer and said second dielectric layer are a low-K dielectric material of methyl silsesquioxane (MSQ), or hydrogen silsesquioxane (HSQ).
- 27. The structure according to claim 26, wherein said first dielectric layer and said second dielectric layer are methyl silsesquioxane (MSQ).
- 28. The structure according to claim 25, wherein said LPD silica layer is a fluorine-containing silica layer comprising 6-10 atom% of fluorine.
 - 29. The structure according to claim 28, wherein said LPD silica layer is a fluorine-containing silica layer and said fluorine-containing silica layer is subjected to a nitrogen plasma treatment or NH₃ plasma treatment, so that the treated fluorine-containing silica layer comprises 3-50 atom% of nitrogen and 0.5-10 atom% of fluorine.

- 30. The structure according to claim 25, wherein the LPD silica layer has a thickness between 10 to 30 nm.
- 31. The structure according to claim 25, wherein a summation of the thickness of the first dielectric layer and the thickness of the second dielectric layer are between 800 to 1200 nm.